Agricultural Supply Chain Resilience

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DeIDOT

IHS Markit

®
Terminology

- Supply Chain
- Resilience
- Transportation Interests
Supply Chain

- The sequence of processes involved in the production and distribution of a commodity
Agricultural Supply Chain
Resiliency

- The ability to withstand or recover quickly from difficult situations
Transportation Interests

- Why is DelDOT interested in the agricultural supply chains in DE?
Summary of agricultural findings

- Significant growth in crop irrigation has allowed Delaware and Delmarva crop yields to advance dramatically in the past decade
- Delaware corn yields have surged past the national average remaining above 190 bushels per acre during the past 3 seasons
- The greatest risk to these baseline figures is the starting point for corn yields
- Poultry production in Delmarva has seen a comeback in the past few years
The Delmarva Study Region

- Delmarva Counties and Business Economic Areas (BEAs)
  - Covers three States and three BEAs
  - Washington, DC BEA includes Cecil, Kent, Queen Anne’s, Talbot, Caroline, and Dorchester counties in Maryland.
  - Philadelphia, PA BEA includes New Castle and Kent counties in Delaware.
What has allowed for the rebound in regional poultry production?

- Reduced grain prices
- The industry in the region has become more comfortable
- Regional based integrators
Factors effecting the projected corn deficit in Delmarva?

- Reduced global grain prices
- The region will see continued expansion in irrigation use as water supplies remain
- Another factor tempering the growth in irrigation moving forward will be the logistics of installing on rented land and also in smaller
Overall Delmarva Freight Flows

- **Truck Traffic Dominates Tonnage**
  - Tonnage will increasingly favor trucking
  - Rail will grow slowest due to the nature of the regional network
    - Rail data is shown for Salisbury and Seaford terminals
  - Water traffic will grow modestly
  - Agricultural flows will grow on pace with general freight growth
  - Water will become increasingly important to agricultural flows
  - Rail will continue to be a small portion of the market

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### Delmarva Freight by Direction, thou. tons

<table>
<thead>
<tr>
<th>Direction</th>
<th>2014</th>
<th>Share</th>
<th>2030</th>
<th>Share</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inbound</td>
<td>20,400</td>
<td>20%</td>
<td>35,715</td>
<td>20%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Local</td>
<td>7,573</td>
<td>6%</td>
<td>9,311</td>
<td>6%</td>
<td>1.3%</td>
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<tr>
<td>Outbound</td>
<td>29,192</td>
<td>22%</td>
<td>39,926</td>
<td>22%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Through</td>
<td>71,043</td>
<td>53%</td>
<td>92,081</td>
<td>52%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Total</td>
<td>135,054</td>
<td></td>
<td>176,405</td>
<td></td>
<td>1.7%</td>
</tr>
</tbody>
</table>

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### Delmarva Freight by Mode, thou. tons

<table>
<thead>
<tr>
<th>Mode</th>
<th>2014</th>
<th>Share</th>
<th>2030</th>
<th>Share</th>
<th>CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>122,549</td>
<td>91%</td>
<td>161,406</td>
<td>91%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Rail</td>
<td>2,834</td>
<td>2%</td>
<td>3,353</td>
<td>2%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Water</td>
<td>9,671</td>
<td>7%</td>
<td>11,837</td>
<td>7%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Total</td>
<td>135,054</td>
<td></td>
<td>176,405</td>
<td></td>
<td>1.7%</td>
</tr>
</tbody>
</table>
# Key Transportation Infrastructure

## Transportation Assets by Mode with Role Description

<table>
<thead>
<tr>
<th>Mode</th>
<th>Assets</th>
<th>Role in the Regional Supply Chain</th>
</tr>
</thead>
</table>
| Roadways         | I-95 System       | - Primary point of entry and exit to the region by truck; includes I-295 and I-495  
|                  |                   | - Through route from South to Northeast of US and also to and around Wilmington  
|                  |                   | - Fresh, northbound poultry transits I-95 to major out-of-state markets like Pennsylvania and New York  
|                  |                   | - Grain and other chicken feed and vitamins coming from Pennsylvania, New York, and elsewhere in the Atlantic states also transit I-95  |
| State Highway    | Delaware Route 1, US13 and US113 are vital spurs  
| System           | I-50 across the Chesapeake Bay is a critical corridor to/from Baltimore & Washington  
|                  | Limited access in the more urbanized northern parts of the State  |
| Seaports         | Philadelphia      | Has an FDA foreign imports screening facility for food imports  
|                  | Norfolk           | Major site for containerized exports of frozen poultry  
|                  |                  | Grains consolidation and distribution to Delmarva  
|                  | Baltimore         | Some agriculture industry use for the Delmarva Peninsula  |
| Freight Rail     | Norfolk Southern  | The only Class 1 rail serving the Peninsula south of Wilmington via its Delmarva Secondary line, which runs north-south through Delaware and Maryland  
|                  |                   | Limited to 8 trains ingress or egress per day due to bottleneck at Amtrak NEC  |
| Short-lines      |                   | Connect the Delmarva Secondary to the Atlantic coast (DCLR and MDDE), Maryland (MDDE) and Virginia (BCRR)  |
| Inland Waterways | Seaford           | Primarily handles inbound grain for chicken feed but also some outbound grain  
|                  | Salisbury         | Primarily handles inbound grain for chicken feed but also some outbound grain  |
Truck Freight Flow Analysis Summary

- Almost half of freight tonnage is outbound from Delmarva.
- Through tonnage is important to poultry-related tonnage.
- Inbound tonnage is dominated by chicken feed, largely soybeans, while inbound value is largely live chickens for processing.
- Several major trucking flows dominate the overall tonnage and value of Delmarva freight flows.
- Chicken feed enters Delmarva by truck from nearby States.
- Live chickens enter Delmarva from North Carolina for processing.
- Outbound truck traffic is dominated by grain and soybeans after the harvest season.
Inbound Truck Freight Flow Analysis Summary

- Inbound truck flows are split between chicken feed, particularly soybeans, and live poultry for processing.

- Key commodities and origination points include Virginia, North Carolina and Pennsylvania.

- Truck flows tend to be more localized.
Poultry-Related Flows, Inbound Truck
Outbound Truck Freight Flow Analysis

Summary

- Outbound truck flows are dominated by grain, by tonnage, but by value poultry itself dominates flows.

- Destinations are dominated by New York, NY and Philadelphia, PA.

- Grain exports are distributed throughout the region during the harvest season.

- Animal by-products and fertilizers are key commodity groups for outbound truck traffic as well.

- Outbound tonnage should grow 1.4% through 2030, and 1.1% by value.
Poultry-Related Flows, Outbound Truck
Through Truck Freight Flow Analysis Summary

- Through truck traffic is closely linked to major consumer markets.

- The most important of which are Washington, DC, New York City, NY and Boston, MA

- Poultry flows that go through the study region are primarily through the I-93 corridor, and are for consumption.

- By value, processed poultry is the most important commodity group.
Rail Freight Flow Analysis Summary

- Inbound flows form about 99.5% of overall rail tonnage.

- Inbound tonnage is almost entirely composed of chicken feed products.
  - This includes DDGs (Distillers Dried Grains), grains, soybeans and soybean meal.

- Outbound tonnage is small

- Soybean meal is most important commodity group, followed by grain and DDGs.

- Inbound rail tonnage comes primarily from the Midwest

- Poultry production on Delmarva, at the levels currently reached, requires significant grain and soybean meal from the Midwest and South of the United States.
Inbound Rail Freight Flow Analysis Summary

- Chicken feed products drive inbound rail tonnage.
- DDGs are very important to tonnage
- Grain originates in the Midwest as well
- Soybeans and soybean meal
Outbound Rail Freight Flow Analysis Summary

- Outbound rail flows are limited.
- Locations change from year to year
- The commodities sent are typically grain and soybeans.
Water Freight Flow Analysis Summary

- Water traffic is primarily oriented toward chicken feed products.

- Water flows were weighted toward outbound traffic (56%) versus inbound traffic (43%).

- Norfolk, VA is a primary point of origination and a destination for water freight.
Inbound Water Freight Flow Analysis Summary

- Chicken feed products like soybeans, soybean meal and grain are the primary contributors to inbound water flows.

- Soybeans and meal is imported from South America, then transloaded through Norfolk, VA.

- Norfolk is the primary source of inbound traffic, but Richmond, VA is also an important origination point.

- Another key origination point in the Lower Mississippi, in and around New Orleans, LA.
Outbound Water Freight Flow Analysis

Summary

- Barges moved approximately 378 thousand tons in 2014.

- This freight was mostly soybeans and grains.

- During harvest season, significant quantities of excess grain are sent by barge to the ports at Norfolk, VA.

- Barge traffic originates in Maryland, usually at the Vienna or Salisbury barge terminals.
Illustration of the Poultry-Related Supply Chain

Water
- Grain

Train
- Grain
- Soybean meal
- DDGs

Truck
- Chickens, Eggs
- Grain
- Fertilizer

- Grain
- Dressed Poultry, Chickens, Eggs
- Soybeans
- Fertilizer/By-Products
Conclusions

- Trucking is the most important mode.

- Rail allows access to the Midwest directly.

- Water gives access to international, Midwestern and other markets.

- The loss of barge or rail would not be catastrophic, in the short-term, but long-term both are required for continued poultry production growth.

- Local storage and production balances are key to determining transportation needs.
Thank you!